A model of a supersonic transport is tested in a wind tunnel at NASA's Langley Research Center in July 1973.

GOING NOWHERE FAST

THE SUPERSONIC TRANSPORT WAS BOTH INEVITABLE AND BENEFICIAL— UNTIL IT TURNED OUT TO BE NEITHER

BY DON BEDWELL

IN SEPTEMBER 1966 THE BOEING COMPANY INVITED AVIATION AND business writers from across the country to its Seattle complex to see a white-and-gold mockup of the company's proposed supersonic transport. The unveiling was accompanied by theatrical lighting and soft music. Afterward the journalists joined Boeing executives in a paddle-wheel cruise up Puget Sound. As the sun descended behind towering evergreens, they docked at a rustic lodge for dinner and a skit about the competition to build the world's first 1,800-mph commercial jetliner. A comedy team visualized a compromise winner that satisfied proponents of Lockheed's double-delta wing and Boeing's variable-sweep wing by having one of each. Unfortunately, they said, the compromise aircraft would fly only in circles—not unlike the furor that ensued as aerospace experts, politicians, and environmentalists debated which company, if either, should build the plane.

Although the little show brought down the house, few involved in the battle for SST supremacy in the 1960s found the competition itself humorous. The stakes were too large, for the nation as well as for the contending aerospace giants. The challenge was daunting, not only for the airframe manufacturers but also for General Electric and Pratt & Whitney, which were competing to build an engine

powerful enough to thrust the mighty jet plane through the air at Mach 2.7.

If the project was chancy for the competing businesses, it also demanded boldness from usually cautious bureaucrats. Government officials had agreed to invest hundreds of millions of dollars in the civilian project because they considered it crucial to maintaining America's aviation leadership. Speed, the contenders knew, had always been the yardstick by which the world measured a nation's aviation stature. With victory in the space race far from assured, America needed a win.

More than prestige was at stake. If American industry won the supersonic race, proponents said, it would gain as many as 50,000 jobs and strengthen its international competitiveness. If it lost, a fortune in airline dollars would flow overseas. Already France and Britain were developing their Concorde, and the Soviet Union was working on its Tu-144. These supersonic projects had taken the lead and were likely to hit the market first. However, they would be both slower and smaller than the American SST.

From the dawn of commercial aviation, air travelers had consistently gravitated to faster aircraft. Between the late 1940s and the early 1960s Americans had watched commercial air travel accelerate like a jet fighter turning on its afterburners. Sturdy but lumbering DC-3s had been replaced by the safer and swifter jetliners that were transforming the nation. At the same time, the Cold War had brought rapid strides in military aircraft, with unmistakable promise for commercial aviation.

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Ever since Chuck Yeager had broken the sound barrier with the rocket-powered Bell X-1, on October 14, 1947, defense contractors had been capitalizing on that potential. The Air Force's B-58 Hustler was blasting across the continent at supersonic speeds, defending the nation against the Communists and leaving a trail of shattered glass in its wake. If Strategic Air Command bombers could cross the country in a little more than two hours, why couldn't civilian passengers cross the Atlantic in three? It seemed an inalienable American right.

Halaby and Kennedy near Eero Saarinen's Dulles control tower in November 1962.

In 1959 Robert Six, of Continental Airlines, became the first U.S. airline president to advocate supersonic transports. "While each transport will cost some two and a half times as much as our subsonic jets," he told stockholders, "productivity will be more than three times greater." Yet many of Six's contemporaries, who were just starting to finance the first generation of subsonic jetliners, flinched at the prospect of adding SSTs to their fleets. It was a vast undertaking, even for an industry that traditionally practiced financial brinkmanship to capitalize on new technology.

For the next several years, during which NASA's Apollo program got under way, the SST remained just a notion, with a modest government program funding a few research studies. Then, on June 4, 1963, Juan Trippe, president of Pan American World Airways, forced the nation's hand by announcing that his company had taken options on six Concordes. Air France and Britain's BOAC had already ordered six apiece; this was soon increased to eight. Pan Am's action, which would be followed later in the year by Continental, American, and Trans World Airways, threatened to deliver a major jolt to the nation's pride—not to mention its balance of payments—if the Concorde lived up to its contract promises.

President John F. Kennedy dropped a bombshell of his own the following day at the Air Force Academy, in Colorado Springs. The young President, who had already launched the nation on its race to the moon, challenged Americans to build a commercial SST. Kennedy said the U.S. government "should immediately commence a new program in partnership with private industry to develop at the earliest practical date the prototype of a commercially successful supersonic transport superior to that being built in any other country in the world."

The President acknowledged that his decision was "spurred by competition from across the Atlantic." In private, he had expressed the stakes more candidly: "We'll beat that bastard de Gaulle." Administration sources denied that he had added the

OVERLEAF: NASA. LEFT: © BETTMANN/CORBIS. RIGHT: © MIROSLAV ZAJIC/CORBIS.

SST announcement only after Trippe's options on the Concorde were disclosed, and in fact studies had been going on for some time. Najeeb Halaby, the Federal Aviation Administrator, had even urged Trippe to delay signing a contract for the Concordes until Kennedy could announce an American SST program. The President was furious when Trippe didn't wait.

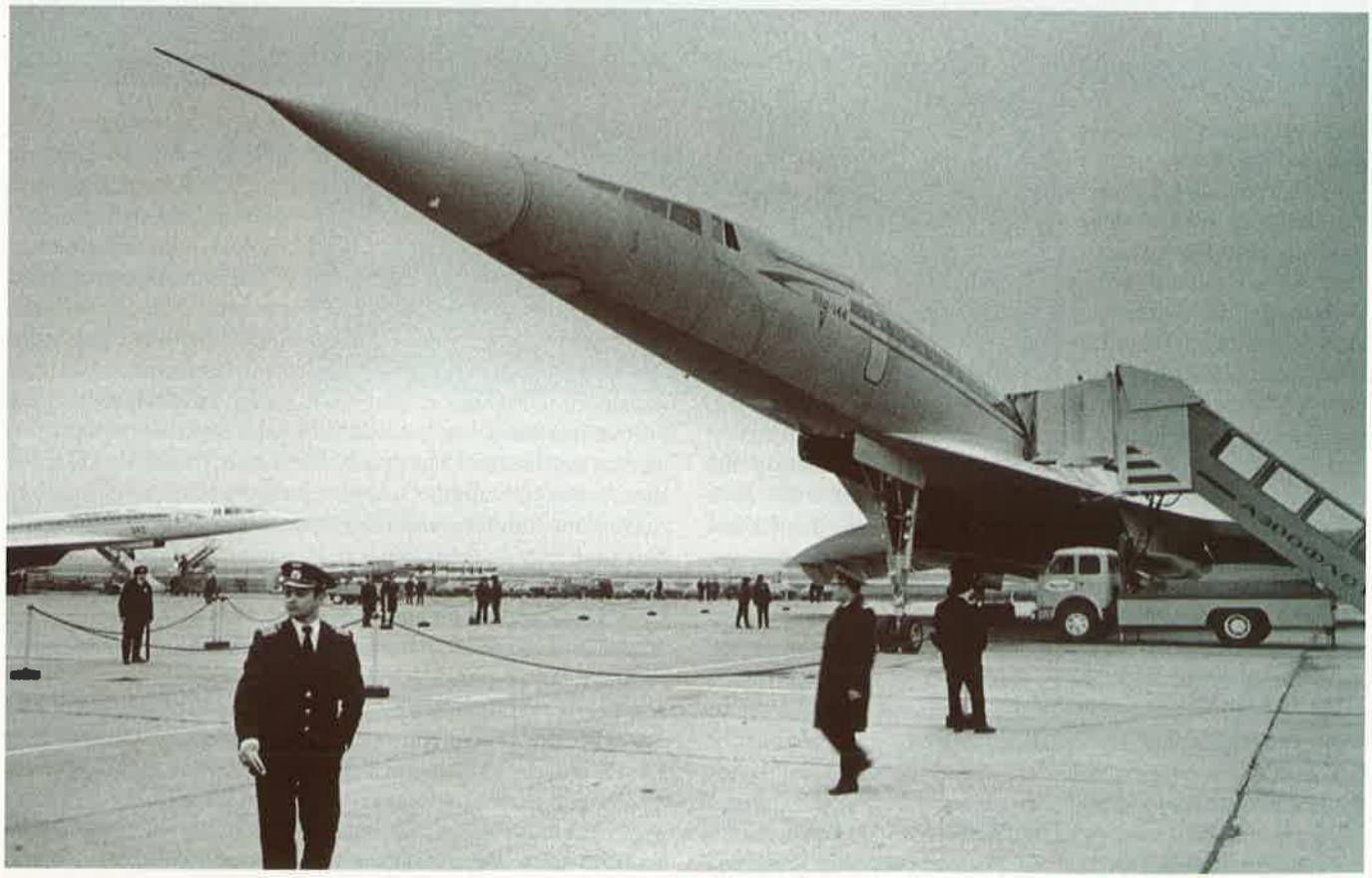
Several days before Pan Am's announcement, a multiagency committee headed by Vice President Lyndon Johnson had submitted a report recommending that the country move ahead on an SST. At Kennedy's request, Halaby—a former Navy and Lockheed test pilot who had succeeded Elwood ("Pete") Quesada as Administrator in 1961—sounded out executives who were already exploring SST engine research (under a program initiated by Quesada) and received a positive response.

Therefore, Kennedy had reason to believe the nation could build an SST. Yet his estimates to Congress that the aircraft would require no more than a billion dollars over six years—and that the government's share "in no event . . . will be permitted to exceed $750 million"—sorely underestimated the challenges. He was asking American industry to design and build quickly a revolutionary new flying machine whose potential problems had not even been fully identified, much less overcome. Kennedy's assassination left the difficult project to his successors—Johnson and, in 1969, Richard Nixon.

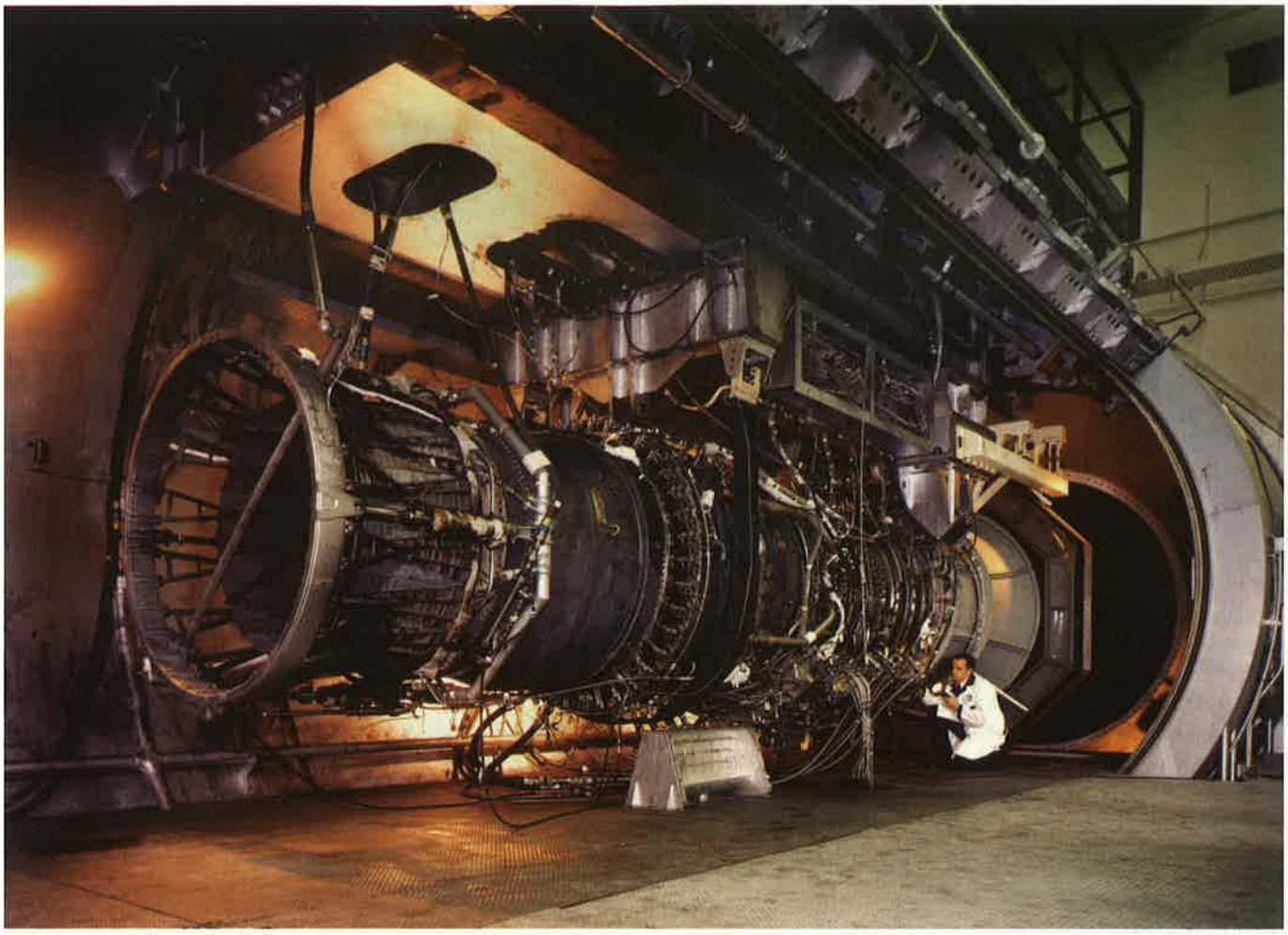
The Federal Aviation Agency was designated to oversee the SST. It established a special office, headed by Gordon Bain, a blunt, no-nonsense Halaby deputy. As the program moved forward, Bain would be succeeded by the Air Force's Brigadier General Jewell ("Bozo") Maxwell, who had guided development of the B-52 and B-58, and later by William Magruder, who had been an engineer and a test pilot for the Air Force, Douglas, and Lockheed. The agency itself would be renamed the Federal Aviation Administration when the U.S. Department of Transportation was created in 1967.

SUPPORTERS POINTED OUT THAT AIR FORCE AND NAVY jets had routinely been flying supersonic since the early 1960s. They downplayed the fact that military aircraft were far smaller than the proposed SST and usually broke the sound barrier only in short bursts, lessening the impact of the sonic booms that trail any aircraft flying at supersonic speeds. While military publicists could boast that their booms were "the sound of freedom," that claim would be considerably less inspiring when applied to a luxury liner carrying moneyed travelers paying premium fares.

A team led by Eugene R. Black, former head of the World Bank, and the New York investment banker Stanley de J. Osborne warned against engaging in a



Supersonic Tu-144s cater to the jet set of Almaty, Kazakhstan, U.S.S.R., in 1977.



The massive GE-4 engine, the most powerful of its time, was to power Boeing's SST.

race to beat the Concorde. The Europeans had jumped out ahead of U.S. industry in the early 1950s with Britain's de Havilland Comet jetliner, the report noted, but it had had to be redesigned after three of them ripped apart in midair as the result of metal fatigue. Rushing to meet Kennedy's expedited timetable could doom the SST, and perhaps its passengers as well.

Congressional critics expressed dismay that taxpayers' money would underwrite at least 75 percent (which would later grow to 90 percent) of a civilian project whose necessity had yet to be demonstrated. Opponents wondered why private capital could not be found to back the venture if it was so promising. (An FAA official countered somewhat lamely that the government would make back its investment after 300 SSTs were sold.) Sen. J. William Fulbright, of Arkansas, denied that "this nation's prestige will in any way suffer if someone else this time builds a bigger—and more expensive—mousetrap."

SUPPORTERS OF THE GROWING ENVIRONMENTAL MOVEment protested too. Some of the environmentalists' claims would be proven unwarranted, including fears that SSTs would litter the upper atmosphere with frozen condensation trails (contrails), like airborne graffiti. Still, many respected authorities were among those raising their voices in alarm. Sir William Hildred, director-general of the International Air Transport Association, had argued as early as 1961 that the price and high operating costs of any supersonic airliner would cripple the industry financially. He railed memorably: "I hope I shall not live to see the damn thing."

Despite such fears, FAA planners moved ahead. In August 1963 the agency spelled out its initial performance objectives to potential airframe and engine bidders. It requested proposals for a jetliner that could carry at least 125 to 160 passengers (this requirement was later increased) plus cargo at least 4,000 miles, cruising at Mach 2.2 (about 1,450 mph) or better. Limits were imposed on noise, including sonic booms. The kicker: The winner would have to show that its design could be "economically viable."

Guaranteeing sleepless nights for bidders, the agency specified that they had to respond by January 15, 1964. Unless "clearly superior" proposals were offered, the FAA would name two airframe and two engine manufacturers to compete, with a final decision to be made later. Three airframe and three jet-engine manufacturers responded with voluminous proposals to be reviewed by a committee that included experts from the FAA, NASA, the Air Force, the Navy, the Civil Aeronautics Board, and the Commerce Department. Airline representatives also participated.

Airframe proposals were submitted by Boeing, one of the world's most respected producers of commercial jetliners;

LEFT: COURTESY OF GENERAL ELECTRIC; RIGHT: © BETTMANN/CORBIS

Lockheed, which had built many of America's most technologically advanced aircraft; and North American Aviation, which submitted a design patterned after its experimental Mach 3 XB-70 Valkyrie bomber—an aircraft that many experts saw as the test-bed for commercial SST technology.

Although Douglas Aircraft had published a study projecting a market for hundreds of Mach 3 airliners, it chose not to bid, saying its assembly lines were too busy. Convair also declined; the manufacturer had been unable in 1961 to persuade the government to pay for modifying a dozen of its B-58 Hustler bombers to gain more knowledge about supersonic flight.

The engine bidders were also among the nation's top aerospace companies. General Electric had introduced jet power to U.S. aviation during World War II. Pratt & Whitney was the industry's major supplier of both commercial and military engines. Curtiss-Wright and its predecessors had been building power plants for American planes since the dawn of aviation history.

After months of review, the evaluation team concluded that none of the proposals were acceptable. On May 20, 1964, the agency asked four companies to refine their proposals. Boeing and Lockheed got six-month design contracts to submit final proposals to build the airframe, while GE and Pratt & Whitney would compete to supply the power plants.

GE and P&W had come up with engines that, in *Fortune*'s words, "differ from each other almost as radically as the Boeing and Lockheed airframes." P&W had submitted a surprising new fanjet design that supplemented the exhaust thrust from its combustion core with a fan to accelerate air passing around the core. This JTF-17 "bypass" design sought to provide a quieter and more efficient engine at subsonic speeds. For supersonic thrust, P&W proposed injecting fuel into the fan air leading to the exhaust duct pipe.

GE proposed a souped-up version of its J-93 straight-jet engine, describing it as a design already proven through experience on the XB-70. Designated the GE-4, it was meant to achieve supersonic speeds with the largest afterburner ever built. That kick-in-the-pants device was often employed by jet fighters to reignite exhaust gases for additional thrust at critical times. The GE-4's advanced engineering would air-cool its turbine blades through painstakingly drilled channels in order to survive temperatures as high as 2,300 degrees, 500 degrees hotter than most jet engines. It would operate more efficiently at high speeds than the P&W design and cost less.

OPPONENTS OF THE SST WONDERED WHY PRIVATE CAPITAL COULD NOT BE FOUND TO BACK THE VENTURE IF IT WAS SO PROMISING.

If GE had a well-tested engine, it also had a serious image problem among airline executives. John Pirtle, who headed GE's SST engineering program, recalls that Donald Nyrop, CEO of Northwest Orient Airlines (and a former head of the Civil Aeronautics Board), once told him, "Look, if I need an airplane, I go to Boeing; if I need an engine, I go to Pratt & Whitney; and if I need a light bulb, I go to General Electric." Relishing the last laugh, the GE team would produce the most powerful turbojet built up to that time, generating 69,900 pounds of thrust—enough, it pointed out, to illuminate a million light bulbs.

Lockheed unveils a full-scale model of its L-2000 SST in Burbank, August 1966.

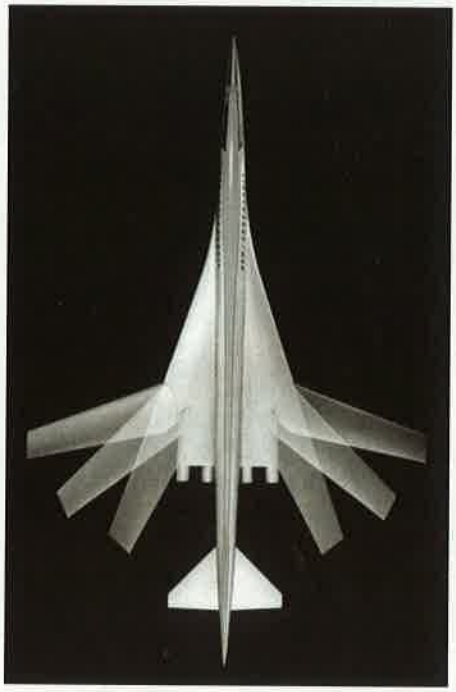
Yet it was the competition over the airframe that drew the most attention. Both Boeing and Lockheed proposed lance-like aircraft about 300 feet long, fabricated of titanium alloys capable of surviving 1,500-mph-plus speeds, which could melt the aluminum skin used on most aircraft, including the Concorde. Titanium was critical in constructing high-speed aircraft and engines because of its strength, low density, and corrosion resistance even in hostile environments. Yet those same properties made it hard to shape, extrude, weld, rivet, or drill. Careless workmanship could even be disastrous, since under extreme conditions titanium can ignite.

Both designs featured needle noses that could be tilted downward to provide pilots better visibility when taking off, flying at low altitudes, or taxiing. Lockheed's L-2000 had been designed by a team headed by Robert A. Bailey, a veteran engineer who had helped design the Navy's Neptune patrol plane. Presiding over Bailey's team was Clarence "Kelly" Johnson, creator during World War II of Lockheed's "Skunk Works," which had produced the P-80 Shooting Star, the Air Force's first

BOEING'S WING, WHICH COULD SWING IN AND OUT, BECAME A TARGET FOR CRITICS, WHO FOUND IT COMPLICATED AND POTENTIALLY DANGEROUS.

truly operational jet fighter; the F-104, the first Mach 2 fighter; and the high-altitude U-2 spy plane.

Lockheed's proposed SST was modeled after the U-2's successor, a secret CIA reconnaissance aircraft that would later gain fame as the SR-71 "Blackbird," the highest-flying and fastest jet ever developed. That project had given Lockheed experience creating a titanium aircraft that could operate at speeds beyond 2,000 miles per hour at altitudes to 80,000 feet. The experience helped the company design the faster of the two SST entries, at Mach 3 (approximately 2,000 mph), compared with Boeing's Mach 2.7 (1,800 mph). Originally planned for just 218 passengers, Lockheed's model had been redesigned to carry closer to Boeing's estimated 300. The swift and straightforward L-2000 was an early favorite, despite a somewhat ungainly appearance on the ground. Don Dwiggins, author of *The SST: Here It Comes, Ready or Not* (1968), described the aircraft as "fiercely poised on three jointed legs, its articulated nose drooping like an angry aardvark's."



Boeing's wing moved back and forth as needed.

Boeing's team was headed by Maynard Pennell, who was no stranger to big projects. During World War II he had helped develop the B-29 Superfortress, which crippled Japan's warmaking capacity. Early in the Cold War he and other talented Boeing engineers conceptualized the Air Force's B-52 bomber in a single weekend. Moving to Boeing's new transport division, Pennell guided the successful launch of the Dash 80, the prototype for the nation's first commercial jetliner family, the 707/720. He later supervised development of the trijet 727, one of the most popular airliners ever built. A mild-mannered aeronautical engineering graduate of the University of Washington, Pennell described his management style as "permissive in how my people work but demanding in what they accomplish."

The competing designs had many differences, most visibly in their wings. Lockheed's L-2000 would soar on fixed double-delta wings patterned after those of the SR-71. That design, with a triangular winglet forward of the main wing to enhance lift and stability, permitted Lockheed to eliminate the customary horizontal stabilizer. The company argued that its wing was simpler than Boeing's, permitting a lighter SST with no structural sacrifice, and allowed safer low-speed landings.

The Boeing model's variable-geometry sweep wings, unprecedented in a commercial aircraft, would extend almost straight out for takeoffs and landings. For supersonic flight, they would fold into a dartlike shape reminiscent of a diving hawk. Boeing claimed that its wing would permit faster takeoff with less power and noise—a major selling point—and would be easier for pilots to master.

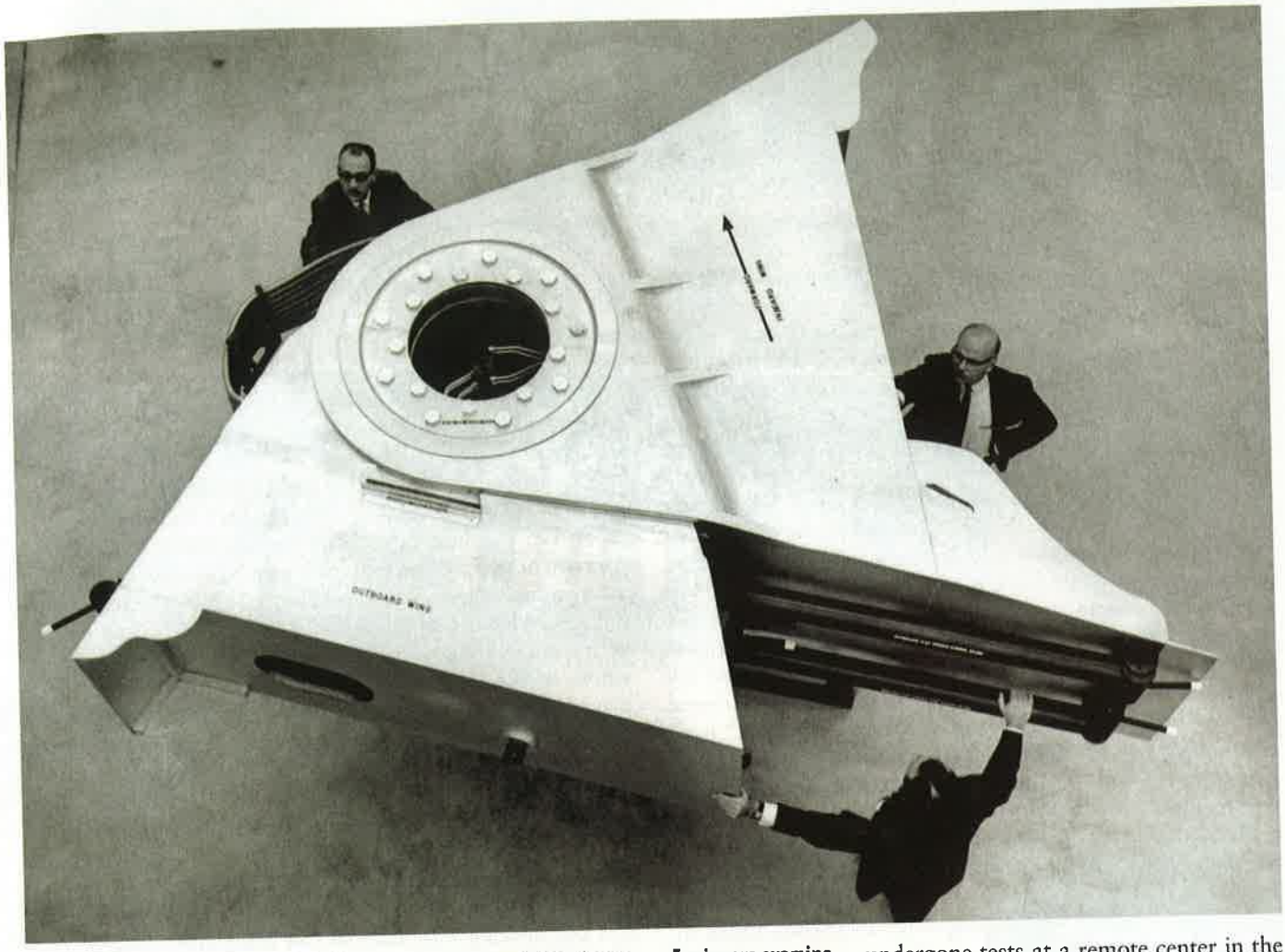
The company had been inspired by its swing-wing design for the TFX, a multiservice fighter for the Air Force and Navy championed by Robert McNamara, the Secretary of Defense. However, Boeing had failed to win that contract in 1962, after McNamara overruled the Pentagon and selected General Dynamics, which went on to build the multiservice fighter as the F-111. Critics fumed over the politics of that decision. For Boeing, it not only cost jobs but eliminated the opportunity to experiment thoroughly with the swing-wing concept by building and flying a real aircraft.

Boeing's wing design became a target for critics, who found it complicated and potentially dangerous, pointing out that the entire stress of each wing passed through a huge single pivot. And as the date for submitting final designs drew near, Pennell's team found itself facing an engineering crisis. To make the fighter-plane design work in a 300-passenger airliner, engineers had to enlarge those swing wings and ask GE to provide more power. The modifications made it necessary to move the four engines farther aft. Designers worked furiously on the changes right up to the deadline for submitting final proposals. Boeing met the deadline, but it would not be the company's last redesign, or its last crisis.

Even without Boeing's down-to-the-wire tinkering, there was a feeling in the industry that Boeing and Lockheed should build prototypes and compete in a "fly-off" to prove which was superior. But with costs soaring for both the SST and the war in Vietnam, government officials opted for the cheaper analytical approach. In May 1966 Najeeb Halaby's successor at the FAA, William McKee, told the House Appropriations Committee that only one SST design would be selected for construction. So the choice would be made through an unprecedented approach—paper submissions, supplemented by full-scale mockups and live engine tests.

Concerned with the mounting costs, President Johnson had appointed McNamara to lead a special advisory committee that

BOTH PAGES: COURTESY OF BOEING



Engineers examine the pivot on which Boeing's "swing wing" would turn.

kept an eye on the program. McNamara was a surprising choice, for he had been outspoken in insisting that SST expenditures could not be justified on military grounds. He was also leading the fight, eventually victorious, to terminate the XB-70 research program, which could have provided data vital in developing a commercial SST (only two of North American's 2,000-mph XB-70 bombers were ever built, and one was lost in a midair collision).

MCNAMARA'S APPOINTMENT TO THE COMMITTEE, on April 1, 1964, had been welcomed by European manufacturers, who were pleased to see any delays on the U.S. side, since the Concorde had been slowed by its own technical problems. *The Economist*, a British magazine, observed that the U.S. program had "been placed under the notoriously cold-blooded Defence Secretary Robert S. McNamara" and concluded that the program was shifting "from the technical difficulties of flying 200 tons of metal about at supersonic speeds to economic ones—making such a machine pay."

The evaluation team announced its decision on New Year's Eve 1966: Boeing and GE would build two prototypes by 1969 that could begin carrying passengers by the mid-1970s. The loss was a devastating blow to Lockheed and P&W, which had spent millions of dollars and countless staff hours on the competition. In Florida, where P&W's JTF-17 engine had undergone tests at a remote center in the Everglades, employees sadly trucked their three experimental engines to a "dormant storage" warehouse. The engines, officially the property of the FAA, represented a $50 million investment. The company had little to show for that money except technology to improve P&W's J-58 engine, which powered the SR-71. "We still feel we built a damn good engine," one P&W employee insisted. The FAA didn't disagree, explaining that GE's engine was chosen because it would perform most satisfactorily with Boeing's winning airframe.

Lockheed's L-2000 mockup was reclaimed by the FAA, disassembled, and carted off to the agency's research center in Oklahoma City to be used for passenger evacuation tests. When it outlived its usefulness, it was scrapped. The mockup's demise reflected a difficult period in Lockheed's history. The company's wide-body L-1011 TriStar, its gamble to re-enter the commercial jetliner business, encountered sluggish sales in its competition with McDonnell Douglas's similar DC-10. Then the bankruptcy of Britain's Rolls-Royce Ltd., the TriStar's engine provider, jeopardized the entire program. In the ensuing financial crisis, Lockheed needed a controversial $250 million government loan guarantee to avoid bankruptcy.

Yet in the years that followed, Lockheed would look back on its loss in the SST derby with few tears. The company, re-

named Lockheed Martin Corporation in 1995 after merging with Martin Marietta, remains one of the world's aerospace and defense leaders. Indeed, life may have been more difficult for Lockheed's victorious rival.

It soon became clear that Boeing had not overcome its wing problems and the related weight crisis. Weight estimates grew from 500,000 pounds in 1966 to a more realistic 675,000 pounds in 1967, with rumors circulating that it would reach 800,000 pounds or more. That extra weight would either curtail the range or reduce the 300-passenger capacity or both. It would also magnify the sonic boom, which had already led government officials to prohibit SST flights over U.S. land areas.

In the spring of 1968 mounting design problems prompted Boeing to stall the project just before metal cutting was to begin on a prototype. H. W. Withington, the manager of the company's SST branch, said development would be delayed at least a year to avoid more costly fixes after the aircraft was actually built. Boeing began trimming as much as 50,000 pounds to save the program. The Johnson administration gave the company until January 15, 1969, to complete a redesign. In the fall of 1968 the company announced that its swing wings had been replaced by what company officials called "idealized" fixed wings based on a NASA design. To reporters who later saw a full-scale aluminum mockup, they looked a lot like Lockheed's rejected double-delta wings.

President Nixon, like his predecessors, vowed to support the program. "The SST is going to be built," he insisted in September 1969. He found it necessary to give a vote of confidence because the program was coming under increasing attack by environmental groups, including Friends of the Earth, whose full-page ads in major newspapers said the SST's sonic boom would "hasten the end of the American wilderness." Newspapers across the country joined in with generally scathing editorials. Even Charles Lindbergh came out against the SST.

LOCKHEED WOULD LOOK BACK ON ITS LOSS IN THE SST DERBY WITH FEW TEARS. LIFE MAY HAVE BEEN MORE DIFFICULT FOR BOEING.

Seeking a hard-hitting defense, Nixon appointed Lockheed's William Magruder as the FAA's third SST program director in April 1970. Magruder, a handsome, articulate battler with a crew cut and a winning manner, toured the country denouncing "alarmist" critics for trying to indict the airplane with allegations that had been disproved early in the planning. He argued that critics relied on environmental arguments because "they cannot attack its technical feasibility."

NIXON ALSO APPOINTED A 12-MEMBER COMMITTEE TO provide validation. Instead, the committee excoriated the SST, not only as a potential environmental disaster but also as an economic one for both the government and the airlines. GE's John Pirtle, whose job had been broadened to include persuading senators to continue their support, found a growing number of them becoming restless under badgering by Sen. William Proxmire, of Wisconsin, a longtime scourge of government waste.

After several preliminary skirmishes, the two sides collided in a final showdown in May 1971, as both houses weighed in on an $85.3 million appropriation to continue funding construction of two prototypes. House members narrowly approved the measure, but the Senate vote looked grim. The administration reminded the senators that a billion dollars had already been spent by the government, the contractors, and 26 airlines, whose orders for 122 SSTs remained on the books. Nixon placed calls to waffling senators, warning of massive layoffs and pointing out that it would cost more to terminate the program than to complete the prototypes. The appeals made no difference. When the final vote was tallied, the Senate had ended the program by a 58–37 margin.

"The country just wasn't ready for an SST," says Pirtle, who was disappointed but not surprised. Congress's abrupt reversal "left us sitting there with a hell of a lot of knowledge about design and working with titanium," he complains. Congress continued funding several research programs designed to gather and preserve supersonic data. Contractors found ways to use SST know-how in developing later aircraft and engine designs. For example, a facility GE created to test engine performance at the SST's high altitudes remains in use today at its complex near Cincinnati, Ohio.

Pirtle moved on to head GE's program developing an engine for the Air Force's B-1 bomber. Some 1,600 GE employees were not so fortunate; they found themselves on the street in an aerospace market that had slumped into recession. About 13,000 workers across the country were idled by the termination, which hurt not only Boeing and GE but subcontractors including North American Rockwell, Fairchild Hiller, Northrop, and the Rohr Corporation.

The hardest hit was Boeing, which was already badly wounded by the recession. It had booked no new airline orders in 1970, and many of its multimillion-dollar 747 jumbo jets were sitting idle. "Boeing came within an eyelash of bankruptcy," said Phil Condit, the company's president, in a 1996 speech. Boeing laid off 22,000 workers in 1971 after having laid off 66,000 in the previous two years in what came to be known as the Boeing Bust. Seattle's unemployment rate soared to 17 percent. Boeing's SST mockup was sold to a Florida promoter, who exhibited it at a roadside attraction. When that attraction failed, the remaining parts of the mockup were sold to the Hiller

THE OTHER SSTs WERE THE EUROPEAN AND SOVIET VERSIONS REALLY ANY MORE SUCCESSFUL?

CONGRESS'S TERMINATION OF THE SST PROgram did not ensure success for either the Anglo-French Concorde or the Soviet Tu-144. Both came into service in the mid-1970s and were plagued with their own misfortunes. The foreign supersonics required massive government subsidies in a race that ended up producing only 20 Concordes and 17 Tu-144s, and both types ultimately experienced horrific disasters.

In its prime the Concorde conjured up a mystique of VIP comfort and convenience at twice the speed of sound. Passengers were treated like celebrities and paid roundtrip fares of $12,000 or more for the privilege. Air France and British Airways each took seven production Concordes; six others never carried passengers. The airlines paid far below the $20 million sticker price for some of them after OPEC's price increases frightened away potential buyers from an aircraft that drank three and a half times as much fuel per passenger-mile as the Boeing 747. Noisy Olympus engines restricted nighttime operations into New York City, while the sonic boom that had helped kill the American SST similarly restricted the Concorde on overland flights.

An Air France Concorde bursts into flame shortly after taking off from Paris, July 25, 2000.

© REUTERS/CORBIS

However, it was a fiery crash on July 25, 2000, that foreshadowed the end. While taking off from Paris's Charles de Gaulle Airport, an Air France Concorde struck a piece of titanium that had been shed by another aircraft. Rubber from the Concorde's exploding tire created a shock wave that ruptured a fuel tank and sent the flaming aircraft plunging to earth. The crash killed 109 passengers and 4 villagers below. The Concordes did not return to the air until November 2001, following extensive modifications that gained the plane only two more operational years. British Airways made its last commercial flight on October 24, 2003, between New York and London, and then the fleet was parceled out to museums around the world. By conservative estimates, Britain and France invested a combined $3.5 billion to develop an aircraft that was rejected as uneconomical by virtually all the world's airlines.

The Soviet Union's Tu-144 experienced an even more checkered history. In 1965 the French intelligence service arrested and deported the head of the Soviet airline Aeroflot's Paris office after learning that he was feeding Concorde secrets to Moscow. However, another agent apparently managed to slip the KGB a complete set of Concorde blueprints. Such espionage helped the Soviets send the first "Concordski" prototype aloft on December 31, 1968, two months ahead of its European competitor. But the hurried development came at a price. A prototype ripped apart during a demonstration flight at the Paris Air Show on June 3, 1973, killing six crew members and eight victims below.

Cramped, noisy, and unreliable, the Tu-144 didn't begin passenger service until November 1, 1977, almost two years after the Concorde. Less than a year later an inflight fire forced a modified Tu-144D to make an emergency landing, taking several lives. The U.S.S.R. grounded the plane (except for flight testing) soon afterward, though in 1997 a Tu-144D was taken out of mothballs for a joint Russian-American research project to study supersonic flight.

In the end one can say that all three supersonic transport ventures played out rationally on political grounds, if not technical ones. As they had done with their space program, the Soviets used the Tu-144 to maintain an image of technological prowess with another showy "first." This reputation helped support their international status until it turned out to be a Potemkin village. The Concorde never came close to being a paying proposition, but the prestige it won may have been worth the cost—for Britain because it erased the memory of the failed De Havilland Comet, and for France as a follow-up to the success of Sud-Aviation's twinjet Caravelle. More tangibly, it served as a test-bed for European cooperation and an incubator for Airbus, the European airline consortium that is now competing successfully with Boeing. The United States, on the other hand, already had a flourishing aerospace industry, and its international prestige needed no boost, since it had the Apollo program. With no extraneous factors to consider, America's decision could be made on the basis of dollars and cents, and by 1971 that decision had become an easy one.—*D.B.*

The Concorde leaves Paris for the last time, May 30, 2003.

Aviation Museum, in San Carlos, California, where they arrived with a Florida snake on board.

Both Boeing and Seattle survived, of course. The company even absorbed its archrival, McDonnell Douglas, in a 1997 merger, a year after Boeing acquired Rockwell International's North American division. Although Boeing has moved its corporate headquarters to Chicago, most of its plants and equipment remain in the Seattle area.

Passionate environmentalists received much of the credit or blame for the SST's defeat, but during the final debates, arguments dealt almost exclusively with whether the plane made economic sense. In the end a majority concluded that it did not. Ultimately Boeing, GE, and most of the struggling airlines reached the same conclusion. Airlines were especially relieved when Congress voted to refund the $58.5 million they had been required to post when reserving delivery positions. With fuel prices rising, air travel slumping, and new Boeing and Lockheed jetliners sitting idle, many believed the industry couldn't afford to go deeper into debt for an untested aircraft whose estimated price had climbed to nearly $40 million apiece.

DESPITE THE ENVIRONMENTAL ISSUES, FINAL ARGUMENTS FOCUSED ALMOST EXCLUSIVELY ON WHETHER THE SST MADE ECONOMIC SENSE.

Supporters trying to jump-start the SST after the May 1971 debacle were disheartened by the glum assessment from Boeing's board chairman, William Allen, that reviving the stalled program would require new contracts and between $500 million and $1 billion in additional funding. Allen's remarks prompted several wavering senators to drop their support, leading to questions about Boeing's commitment. Rep. John J. McFall, of California, who tried unsuccessfully to keep the SST alive, complained that both Boeing and GE "seemed to welcome the cancellations."

If a lack of industry support did seal the program's fate, some early SST proponents, including Najeeb Halaby, looked back on the decision a few years later as a mercy killing. Given soaring fuel prices and other factors, Halaby summed up the whole eight-year dead end by saying, "An American SST would have been a financial disaster for all concerned: manufacturer, government, and airlines alike." ★

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